REMARKS

In the Office action mailed 12/31/03, the abstract of the disclosure was objected to because of length and a wording choice on line 11. The abstract submitted herewith remedies these problems by correcting the length to less than 150 words, and removing the word "said" from line 11.

The disclosure is also objected to at pages 11 and 12, due to spelling errors in the Incorporation by Reference section. These errors have been corrected herein.

Claims 4-5 are objected to because of wording that recites "software program for providing..." Applicant thanks the Examiner for the suggested corrections, which have been adopted herein.

35 USC 101 Rejections

Claims 1-3 and 5-7 were rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The Examiner stated in the Office action mailed 12/31/03 that claims 1-3 and 5-7 are not explicitly or implicitly declared to produce tangible and concrete results. Applicants request cancellation of claims 1-4 herein, and submits new claims 13-16, directed to a computer readable medium having instructions directed to control of a wireless transmitter. Likewise, claim 5 has been amended to be directed to control of a wireless transmitter. As claims 6-7 depend from claim 5, Applicant respectfully asserts that claims 5-7 as well as claims 13-16 are now in condition for allowance.

35 USC 103(a) Rejections

Claims 1-3, 5-7, and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamakawa et al. (U.S. Patent 6,633,858) in view of Konda et al (IDS reference 27). Applicant respectfully asserts that Yamakawa is irrelevant as it deals with discrete Q learning. For example, Yamakawa uses expressions like hash tables, vector lists, and action lists. All are meant to deal with discrete Q learning something that well known in the art. However, the present invention is directed to reinforcement learning applied to fuzzy logic rule-based control.

In the Examiner's rejection of our claim 4 on page 15 line 11, the examiner references Sutton's work on wireless transmitters. However, Sutton does not use a fuzzy rule base to instruct the control strategy.

The Examiner cites Yamakawa at Fig.19, col.15, lines 27-35 as disclosing "a control program...read a control program." In summary, this portion of Yamakawa states that there is a control program that directs a computer to execute a generation process for an action sequence performed by each of problem solvers according to a set of embodiments stored to a computer readable storage medium. The program does what Yamakawa is asking it to do. But the problem is with Yamakawa's method, which does not approximate the present invention. Yamakawa restricts his method to discrete states. This is much simpler problem to solve than continuous problem solving method that the present invention introduces. In order to extend discrete reinforcement learning to continuous reinforcement learning, Applicants have used a fuzzy rule base. There is not even single reference to a fuzzy rule base in the whole text of Yamakawa.

The Examiner cites Yamakawa at col.2, lines 1-7 as disclosing "[a]n actor-critic model...an actor module." This paragraph only repeats a well-known fact of reinforcement learning. Yamakawa's approach uses it for a simple discrete case of

reinforcement learning. The approach can only work for problems with a limited number of states and definitely not for continuous reinforcement learning with infinite number of states as the present invention does.

The Examiner cites Yamakawa at col. 2, lines 36-40 and FIG. 3 as disclosing "a database of fuzzy-logic rules for mapping input data to output commands for mapping a system state." However, there is no mention of fuzzy- logic rules anywhere in this portion of Yamakawa nor anywhere else in Yamakawa. Thus, the present invention is completely different from Yamakawa's method and Yamakawa's method cannot solve the problems solved by the present invention in the form of continuous reinforcement learning where there are a large number of states.

The Examiner cites Yamakawa at Fig. 17; col. 11, lines 18-28 as describing the moveable state...movable state list." This paragraph is another distinguishing statement about the limited scope of Yamakawa's approach when compared to the present invention. Again, this portion of Yamakawa deals with discrete reinforcement learning, but cannot be extended to continuous reinforcement learning with infinite number of states. Again, the present invention can solve continuous reinforcement learning because it uses a fuzzy rule base. Yamakawa's approach does not use a fuzzy rule base.

Similarly, Yamakawa at col.12, lines.13-17 cannot be said to teach, disclose, nor otherwise suggest continuous reinforcement learning.

Yamakawa at col. 14, lines 41-45 refers to developing a landmark database composed of a segmentation function. This strategy cannot work in a continuous reinforcement learning scenario. So again, Yamakawa's method does not apply to continuous reinforcement learning. In contrast, the present invention utilizes a fuzzy logic rule base that provides the necessary function approximation.

Yamakawa at FIG. 16; col. 11, lines 18-53 describes his approach using expressions such as lists, hash tables, action vectors, etc. which only make sense if the number of states are limited. These statements can only be made in the context of discrete reinforcement learning case. Such statements cannot be made for continuous reinforcement learning, a claimed limitation of the present invention.

While the Examiner claims that it would have been obvious to extend Yamakawa's approach with what Konda teaches, Yamakawa's approach only works for discrete domains with limited states and actions. Thus, the claimed limitations of the present invention are not taught, disclosed, nor suggested by Yamakawa and Konda.

Similar reasons are given to support the Examiner's rejection of claim 5. Thus, Applicant's arguments above are respectfully submitted in response to Examiner's rejection of claim 5.

As for claim 9, Examiner asserts that Yamakawa discloses a system controlled by an actor-critic based fuzzy reinforcement learning. On the contrary, in the whole text of Yamakawa's patent there isn't even once use of the term "fuzzy" let alone a description of actor-critic based fuzzy reinforcement learning.

Claims 4, 8, and 12 are rejected under 35 USC 103(a) as being unpatentable over Sutton et al. However, like Yamakawa and Konda, Sutton does not use a fuzzy rule base in his wireless transmitter's method.

Furthermore, there is no suggestion to combine the references cited by the Examiner to achieve an actor-critic-based fuzzy reinforcement learning and apply it to a wireless transmitter's power control.

Applicant respectfully submits that all of the rejections have been traversed requests the examiner place the present application in condition for allowance.

Respectfully submitted,
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